



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF : John Grassi et al.
FOR : **MOLD-REMOVAL CASTING METHOD
AND APPARATUS**
SERIAL NO. : 10/614,601
FILED : July 7, 2003
EXAMINER : Ing Hour Lin
ART UNIT : 1725
CONFIRMATION NO. : 7816
ATTORNEY DOCKET NO. : **GISZ 2 00031**

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned declares as follows:

1. My name is John Campbell and I hold the post of Emeritus Professor at the University of Birmingham, UK. I am also a co-inventor of the instant application. The purpose for this declaration is to supplement my earlier declaration dated 16 July 2005.

2. In the Office Action of 7 February 2006, claim 1 of the application was rejected as being unpatentable over a Japanese Patent Document JP 59156566 in view of a U.S. Patent to Kawaguchi et al, U.S. Patent No. 4,971,134.

3. Claim 1 of the application now recites a process for the casting of metal which includes providing a mold including an aggregate and removing at least a portion of the mold including at least a portion of the aggregate, wherein the step of removing the mold begins before the step of solidifying the molten metal has been completed.

4. The Kawaguchi patent shows a metal mold, as is evident from, e.g., the cross sectional views in numerous figures, for example, Figures 35-38. Also, Kawaguchi states that the mold 1 is formed from a copper chromium alloy (see column 10, lines 11-13 and column 13, lines 8-9). The mold 1 is constructed of a first die 1₁ and a second die 1₂ into a split type and is opened and closed by an operating device (see column 10, lines 14-16).

5. The Japanese '566 document also appears to show a metal mold. This is evident from Figure 5 of the drawings, where a cross-section of the mold is shown. The drawing symbol used in Figure 5 is for metal.

6. In the case of metal molds, such as those shown in Kawaguchi and the Japanese '566 document, including such mold types referred to as "permanent molds" and "dies for die casting processes" etc., it is common for the mold to be opened prior to the complete solidification of the casting. This is widely known, perfectly well understood and practiced in permanent mold foundries and die casting shops all over the world. Therefore, the disclosure of such a mold in the Kawaguchi patent is not remarkable.

7. In many cases, the early opening of the mold is necessary to achieve better productivity for a casting. In the case of die casting, such early opening will, if carried out with excessive zeal, cause the entrapped air in still molten regions of the casting to expand, with the result that the casting distorts or blisters and, in extreme cases, explodes. When such cases are experienced, the foundry will, with reluctance because of loss of productivity, extend time in the mold to further build up the solidified shell to reduce these problems.

8. I am unaware of any method for removing the mold while the casting is still at least partially molten in the case of aggregate molds. Such a practice would probably be dangerous. This is because the lower temperature gradient as a result of the less severe cooling does not build up such an effective solidified shell. In fact, for many alloys, particularly many non-ferrous base alloys that have high thermal conductivity, the temperature gradient in the casting is so low that liquid can remain at the casting surface until the final moments of solidification.

9. It follows, therefore, that it would be unthinkable for the mold to be removed prematurely, prior to complete solidification, and especially with water. Such an action would be unthinkable dangerous. Such danger is fundamental to the thinking of foundry personnel throughout the world. All casting education focuses on the extreme danger of mixing molten metal and water.

10. The Sahari and Conroy patents were discussed in my earlier declaration at paragraph 17. Therefore, they will not be further addressed in this declaration.

11. Claim 16 is to a process for reducing the cooling time of a metal that has been cast. It includes decomposing at least a portion of the mold with a solvent via spraying and cooling the molten metal with the solvent wherein the step of spraying commences before the molten metal has completely solidified. No such decomposition of the molds is seen in the metal molds of Kawaguchi and the Japanese '566 patent. Nor is there such a decomposition in Sahari or Conroy.

12. Claim 47 recites a process for casting an aluminum metal, including decomposing at least a portion of the mold at an elevated temperature with a solvent including water wherein the step of decomposing at least a portion of the mold begins before the molten aluminum metal has completely solidified into a casting. No such decomposition of a mold is shown in any of the patent documents to Kawaguchi, Japanese '566, Sahari or Conroy.

13. Claim 54 recites a process for reducing a cooling time of a metal that has been cast, including percolating a solvent including water through the mold to the cast metal, forming a relatively solid skin on the cast metal while an interior thereof remains molten and subsequently contacting the relatively solid skin of the cast metal with the solvent. Of course, with a metal mold, no such percolation of the solvent through the mold can take place.

14. Claim 62 now recites a method of removing a mold including an aggregate from a casting which is being formed therein comprising directing a fluid stream at the mold when the casting is partially solidified and dislodging at least a portion of the aggregate of the mold from the casting. This method is not shown in any of the patent documents to Kawaguchi, Japanese '566, Sahari or Conroy.

15. There remains no doubt therefore, that despite molten metal being well-known, and despite water being well-known, there can be no case for it being obvious to mix them by early removal of an aggregate mold.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

By


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MMet, MA.

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Date: 18 March 2006